Attorney Docket No. 14407US02

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Application of:

Ronald L. Mahany et al.

Serial No.: 10/692,959

Filed: October 24, 2003

For: WIRELESS PERSONAL LOCAL AREA NETWORK

Art Unit: 2616

Examiner: P.B. Nguyen

Electronically filed on 12/30/08.

By: _____
John A. Wiberg
Reg. No. 44,401

DECLARATION UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Guy J. West, hereby declare the following:

1. I am a named inventor on the above-referenced U.S. Patent Application Serial No. 10/692,959, entitled "WIRELESS PERSONAL LOCAL AREA NETWORK" ("the '959 Application"), the pending claims of which are attached hereto as Appendix A.

2. Ronald L. Mahany (deceased), Alan G. Bunte, Ronald E. Luse, and Charles D. Gollnick are also named as co-inventors on the '959 Application.

3. I am also a named inventor on U.S. Patent Application Serial No. 08/239,267, entitled "MULTI-LEVEL, HIERARCHICAL RADIO-FREQUENCY COMMUNICATION SYSTEM," now U.S. Patent 6,006,100 ("the '100 Patent"), which claims priority to U.S. Patent Application Serial No. 07/876,776, U.S. Patent Application

Serial No. 07/854,115, U.S. Patent Application Serial No. 07/558,895, and U.S. Patent Application Serial No. 07/529,353 (the "Predecessor Applications").

4. Ronald L. Mahany, Alan G. Bunte, Stephen E. Koenck, Keith K. Cargin, Jr., George E. Hanson, Phillip Miller, Stephen H. Salvay, and Arvin D. Danielson are also named as co-inventors on '100 Patent.

5. To the extent that the subject matter claimed in the '959 Application is taught in the '100 Patent and/or its Predecessor Applications, such subject matter was invented by Ronald L. Mahany, Alan G. Bunte, and/or me.

6. The Engineering Development and Record Log (#275) that was prepared and signed by Ronald L. Mahany, dated September 21, 1989 – September 29, 1989, and is attached hereto as Appendix B, discloses the invention as claimed in the independent claims of the '959 Application as conceived by Ronald L. Mahany, Alan G. Bunte, and/or me.

7. I certify that all statements made herein of my own knowledge are true, and that all statements made herein on information and belief are believed to be true. I understand that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. § 1001) and may jeopardize the validity of the application or any patent issuing thereon.

Guy J. West

21/APR/2008
Date

APPENDIX A
PENDING CLAIMS OF SERIAL NO. 10/692,959

10. A transceiver for use in a wireless network device that operates in a communication system that includes a radio network, the transceiver comprising:

a radio unit configured to communicate with the radio network;

wherein the transceiver is operable to enable the wireless network device to participate as a master device on the radio network, operable to control communications on the radio network.

11. The transceiver of claim 10 wherein the communication system further comprises a main communication network and wherein the transceiver is capable of communicating with the main communication network.

12. The transceiver of claim 11 further comprising a processor operable to control the communications of the radio unit with the radio network and capable of communicating with the main communication network.

13. The transceiver of claim 11 wherein the wireless network device is operable to participate as a slave on the main communication network.

14. The transceiver of claim 11 wherein the main communication network comprises a wired communication network.

15. The transceiver of claim 11 wherein the main communication network comprises a wireless communication network.

16. The transceiver of claim 10 wherein the transceiver comprises an integrated circuit.

17. The transceiver of claim 10 wherein the wireless network device is sized to be held by a user.

18. A transceiver for use in a mobile network device that operates in a communication system that includes a radio network, the transceiver comprising:

a radio unit configured to communicate with the radio network;

wherein the transceiver is operable to enable the mobile network device to participate as a master device on the radio network, operable to control communications on the radio network.

19. The transceiver of claim 18 wherein the communication system further comprises a main communication network and wherein the transceiver is capable of communicating with the main communication network.

20. The transceiver of claim 19 further comprising a processor operable to control the communications of the radio unit with the radio network and capable of communicating with the main communication network.

21. The transceiver of claim 19 wherein the mobile network device is operable to participate as a slave on the main communication network.

22. The transceiver of claim 19 wherein the main communication network comprises a wired communication network.

23. The transceiver of claim 19 wherein the main communication network comprises a wireless communication network.

24. The transceiver of claim 18 wherein the transceiver comprises an integrated circuit.

25. The transceiver of claim 18 wherein the mobile network device is sized to be held by a user.

26. The transceiver of claim 10 wherein the transceiver enables the wireless network device to manage communications of a second wireless network device participating on the radio network.

27. The transceiver of claim 10 wherein the transceiver enables the wireless network device to synchronize communications of a second wireless network device participating on the radio network.

28. The transceiver of claim 10 wherein the transceiver enables the wireless network device to manage communications of a second wireless network device participating on the radio network with a third wireless network device participating on the radio network.

29. The transceiver of claim 15 wherein the transceiver enables the wireless network device to manage communications of a second wireless network device, that participates on the radio network, with the wireless communication network.

30. The transceiver of claim 15 wherein the transceiver enables the wireless network device to facilitate communications of a second wireless network device, that participates on the radio network, with the wireless communication network.

31. The transceiver of claim 10 wherein the radio unit is configured to communicate with the radio network using spread spectrum signals.

32. The transceiver of claim 18 wherein the transceiver enables the wireless network device to manage communications of a second wireless network device participating on the radio network.

33. The transceiver of claim 18 wherein the transceiver enables the wireless network device to synchronize communications of a second wireless network device participating on the radio network.

34. The transceiver of claim 18 wherein the transceiver enables the wireless network device to manage communications of a second wireless network device participating on the radio network with a third wireless network device participating on the radio network.

35. The transceiver of claim 23 wherein the transceiver enables the wireless network device to manage communications of a second wireless network device, that participates on the radio network, with the wireless communication network.

36. The transceiver of claim 23 wherein the transceiver enables the wireless network device to facilitate communications of a second wireless network device, that participates on the radio network, with the wireless communication network.

37. The transceiver of claim 18 wherein the radio unit is configured to communicate with the radio network using spread spectrum signals.

38. A wireless network device for operating in a communication system that includes a radio network, the device comprising:

transmit circuitry configured to transmit signals on the radio network; and

receive circuitry configured to receive signals from the radio network;

wherein the device is operable to participate as a master device on the radio network, operable to control communications on the radio network.

39. The device of claim 38 wherein the communication system further comprises a main communication network and wherein the device is capable of communicating with the main communication network.

40. The device of claim 39 further comprising a processor operable to control the communications of the transmit and receive circuitry with the radio network and capable of communicating with the main communication network.

41. The device of claim 39 wherein the device is operable to participate as a slave on the main communication network.

42. The device of claim 39 wherein the main communication network comprises a wired communication network.

43. The device of claim 39 wherein the main communication network comprises a wireless communication network.

44. The device of claim 38 wherein the device is an integrated circuit.

45. The device of claim 38 wherein the device is operable to manage communications of a second wireless network device participating on the radio network.

46. The device of claim 38 wherein the device is operable to synchronize communications of a second wireless network device participating on the radio network.

47. The device of claim 38 wherein the device is operable to manage communications of a second wireless network device participating on the radio network with a third wireless network device participating on the radio network.

48. The device of claim 43 wherein the device is operable to manage communications of a second wireless network device, that participates on the radio network, with the wireless communication network.

49. The device of claim 43 wherein the device is operable to facilitate communications of a second wireless network device, that participates on the radio network, with the wireless communication network.

50. The device of claim 38 wherein the device comprises a PCMCIA card containing the transmit circuitry and the receive circuitry.

51. The device of claim 38 wherein the transmit circuitry is configured to transmit spread spectrum signals on the radio network and the receive circuitry is configured to receive spread spectrum signals from the radio network.

APPENDIX B

#16701 - 16750

NORAND®
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ENGINEERING DEVELOPMENT RECORD LOG

This book is the property of Norand® Corporation but may remain in your possession until termination of your employment with the company, at which time you shall surrender this book to the Department Director.

INSTRUCTIONS:

1. All engineering notes, sketches, schematics, etc., are to be recorded in this book.
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3. Date and sign each log sheet.
4. All log sheets containing information which might have particular significance must be signed and dated by one witness who reads the sheet and understands its contents.

   NOTE: If there are co-inventors both should sign in the area marked writer, and a third party would be required as a witness.
5. Completed books are to be turned into Director's office for permanent filing.
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2. Do not try to erase. If revisions are necessary, cross out and rewrite.
3. Clarity is essential but precision drawings are not required; therefore, free-hand sketches are acceptable.
4. Use of vinyl backing sheet under the page will help make a clear and contrasting entry.

Book No. 225 Assigned To Ron Mahany

BCMSA006642

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PENGAD 800-631-6989

EXHIBIT
43
12-11-13-06

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE____OF____PAGES 0016701

TITLE	MODEL

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BCMSA006643

WRITER	DATE	WITNESS	DATE

Norand Part No. 910-075-000

NORAND DATA SYSTEMS

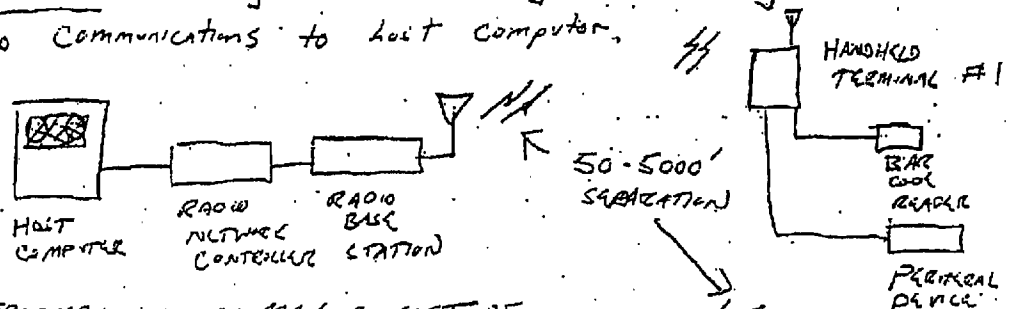
ENGINEERING LOG SHEET PAGE 1 OF ___ PAGES

0016702

TITLE: PORTABLE, RADIO-LINKED DATA COMMUNICATION SYSTEM

MODEL: RT 3000 SERIES

PRIOR ART: Existing data collection systems utilizing bar-code readers and radio communications to host computer.



PERIPHERAL DEVICES MAY CONSIST OF MAGNETIC STRIPE READER/PRINTER/ELECTRONIC SCALE ETC

RADIO NETWORK CONTROLLER MULTIPLEXES 1 -> >128 HANDHELD TERMINALS ON SINGLE CHANNEL

HANDHELD TERMINAL PROVIDES, BATTERY POWER, KEYBOARD AND DISPLAY FOR USER I/O, AND MAY INCLUDE A COMPUTER FUNCTION TO PROVIDE LOCAL DATA PROCESSING

SYSTEM CONCEPT

LOGICAL STEP IS TO COMBINE HANDHELD FUNCTIONS, BATTERY, KEYBOARD, DISPLAY, SCANNER, ETC INTO A SINGLE UNIT. THIS CAN PROVIDE THE USER FREEDOM OF ONE HANDED SCANNING OPERATION, ELIMINATE TETHERING CABLES, PROMOTE EFFICIENT SCANNING OPERATION BY PLACING DISPLAYED INFORMATION DIRECTLY IN FRONT OF ITEM BEING SCANNED. UNFORTUNATELY THE ERGONOMICS OF SUCH A PRODUCT CONCEPT ARE QUITE DIFFICULT TO MANAGE. BOTH PRODUCT (TERMINAL) SIZE AND WEIGHT QUICKLY EXCEED THE LIMITS OF REASONABLE HANDHELD OPERATION WHEN SCANNER, RADIO, PROCESSOR, KEYBOARD, DISPLAY, AND RECHARGEABLE BATTERY CAPACITY TO POWER ALL COMPONENTS ARE INCLUDED IN A SINGLE UNIT. THIS IS PARTICULARLY THE CASE WHEN THE DISTANCE OVER WHICH RADIO COMMUNICATION MUST TAKE PLACE EXCEEDS A FEW HUNDRED FEET - NECESSITATING FAIRLY HIGH POWERED RADIO TRANSMITTERS AND HIGH CAPACITY, LOW IMPEDANCE BATTERIES TO POWER THEM, i.e. indoor factory environments with high ambient

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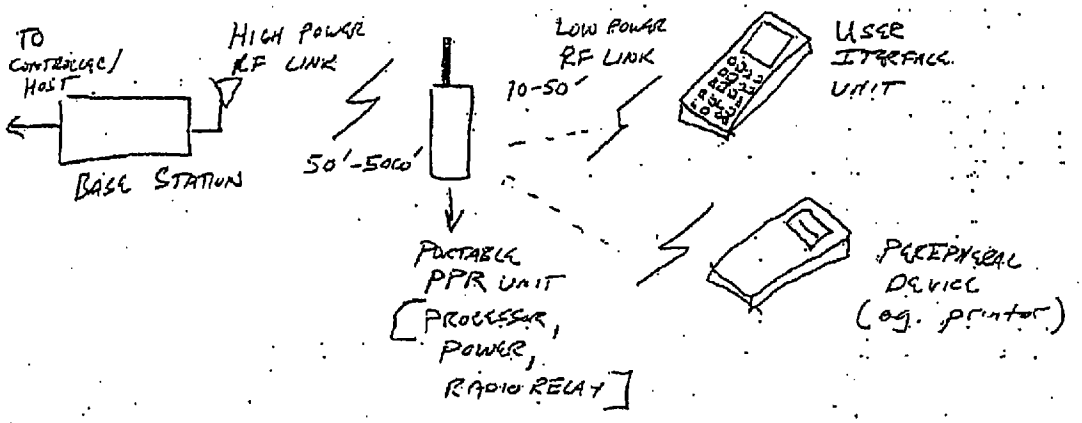
TITLE	MODEL

RF INTERFERENCE LEVELS AND NUMEROUS OBSTACLES TO GOOD RF SIGNAL PROPAGATION.

THE PROBLEMS OF ERGONOMICS CAN BE ALLEVIATED BY THE PORTABLE CONCEPT ILLUSTRATED BELOW:



THE PORTABLE USER INTERFACE UNIT CONTAINS KEYBOARD, DISPLAY, SCANNER, A LOW POWER RADIO TRANSCEIVER, AND A SIMPLE I/O PROCESSOR/CONTROLLER. BECAUSE RADIO COMMUNICATIONS ARE ONLY REQUIRED OVER A SHORT DISTANCE, BATTERY REQUIREMENTS ARE MINIMAL eg. A SINGLE 9V NI-CAD, OR A SINGLE RECHARGEABLE LITHIUM CELL WITH SWITCHING POWER SUPPLY TO PROVIDE 5V. SIMPLICITY OF THE USER INTERFACE UNIT CIRCUITRY AND LOW POWER CONSUMPTION REQUIREMENTS ALLOW GOOD USER ERGONOMICS, SIZE AND WEIGHT.

THE P.P.R UNIT CONTAINS A COMPANION LOW POWER TRANSCEIVER FOR COMMUNICATION TO THE USER INTERFACE UNIT, A HIGH POWER TRANCEIVER FOR COMMUNICATION TO THE HOST COMPUTER VIA THE BASE STATION, PROCESSOR AND MEMORY REQUIRED FOR LOCAL APPLICATION PROCESSING, AND A HIGH CAPACITY BATTERY.

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TITLE	MODEL

PORTABLE P.R.R USAGE

IN A TYPICAL PORTABLE OPERATION ENVIRONMENT THE PPR UNIT WOULD BE WORN ON A BELT OR STRAP, ALLOWING THE WEIGHT OF THE HEAVIEST COMPONENTS OF THE SYSTEM TO BE CARRIED WITHOUT CAUSING USER FATIGUE.

THE PPR UNIT IS ALSO DESIGNED TO ALLOW DIRECT INTERCONNECT BETWEEN IT AND THE A USER INTERFACE UNIT. A MATING CONNECTOR IS PROVIDED TO ALLOW WIRED COMMUNICATION BETWEEN THE TWO UNITS, AND TO ALLOW THE PPR TO RECHARGE THE BATTERY IN THE USER INTERFACE UNIT WHILE THEY ARE MATED- ~~PROVIDING~~ ALLOWING THE ~~BETTER~~ OPERATING LIFE OF THE USER INTERFACE UNIT TO BE EXTENDED.

MECHANICALLY THE PPR INCORPORATES A GUIDING STRUCTURE WHICH HOLDS THE USER INTERFACE UNIT SECURELY BUT ALLOWS CONVENIENT REMOVAL OF THE USER INTERFACE UNIT WHEN DESIRED. THUS, WHEN THE PRR UNIT IS ATTACHED TO A BELT, IT SERVES AS A CONVENIENT HOLSTER FOR THE USER INTERFACE UNIT, ALLOWING THE USER TO DEVOTE BOTH HANDS TO OTHER TASKS DURING PERIODS WHEN THE DATA COMMUNICATION SYSTEM IS NOT BEING USED.

THE P.R.R ALSO INCLUDES AUXILIARY BATTERY INPUTS. IN THE BELTMOUNTED CONFIGURATION, ADDITIONAL BATTERY CAPACITY CAN BE DISTRIBUTED ON THE BELT, PROVIDING ADDITIONAL OPERATING TIME ~~WITHIN~~ AGAIN WITHOUT INCREASING THE SIZE OR WEIGHT OF THE HANDHELD PORTION OF THE SYSTEM.

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TITLE | MODEL

OTHER P.R.R CONFIGURATIONS

MANY OTHER P.R.R. CONFIGURATIONS ARE POSSIBLE:

* IN INDUSTRIAL OR MOBILE USAGE THE P.R.R. CAN BE IMPLEMENTED AS A FIXED MOUNTED MOBILE DEVICE POWERED FROM A VEHICULAR BATTERY - E.G. TRUCK OR FORKLIFT, THE USER INTERFACE UNIT COULD BE HOLSTERED IN THIS "M.R.R" WHEN NOT IN USE RECEIVING CONTINUOUS RECHARGING OF THE USER INTERFACE UNITS BATTERY. IT COULD THEN BE REMOVED AND OPERATED REMOTELY FROM THE VEHICLE SUBJECT TO THE LOW POWER RADIO LINK RANGE LIMITATION.
* IN INDOOR USAGE THE P.R.R. COULD BE CONFIGURED AS A FIXED UNIT OR "F.R.R" THE F.R.R COULD BE POWERED FROM THE A.C. POWER LINE AND MOUNTED ON A WALL OR CEILING. ONE OR MORE USER INTERFACE UNITS COULD OPERATE REMOTELY, USING THE F.R.R TO RELAY DATA TO AND FROM THE HOST COMPUTER VIA THE HIGH POWER RADIO LINK IN THE F.R.R.
* THE F.R.R. FUNCTION COULD ALSO BE INCORPORATED INTO OTHER DEVICES TO PROVIDE HIGHER LEVELS OF SYSTEM INTEGRATION. AN EXCELLENT COMBINATION WOULD BE INSTALLING THE F.R.R FUNCTION INTO A RETAIL POINT OF SALE TERMINAL ALLOWING BAR CODE AND USER KEYED DATA TO BE REMOTELY ENTERED AND WIRELESS COMMUNICATIONS BETWEEN P.O.S. TERMINALS AND STORE CONTROLLERS.
* IN THE F.R.R. CONFIGURATION AN ALTERNATIVE WIRED INTERFACE CAN BE SUBSTITUTED FOR THE LONG RANGE RADIO LINK IF DESIRED.

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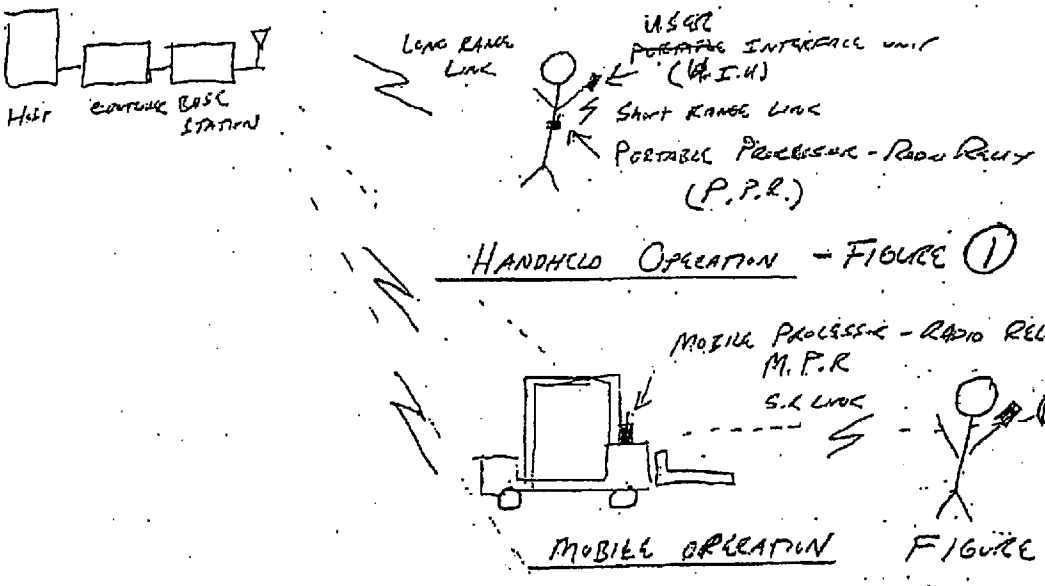
TITLE	MODEL

* IN AREAS REQUIRING ONLY SHORT RANGE COMMUNICATIONS, THE P.P.R/M.P.R./F.P.R FUNCTION CAN BE ELIMINATED COMPLETELY, ALLOWING PORTABLE INTERFACE UNITS TO COMMUNICATE DIRECTLY WITH THE COMMUNICATIONS CONTROLLER VIA A LOW POWER BASE STATION TRANSCEIVER. AGAIN, THIS IS A GOOD FIT FOR RETAIL POINT OF SALE APPLICATIONS, WHERE THE P.O.S. TERMINAL ACTS AS A LOCAL HOST COMPUTER ACCEPTING REMOTELY KEYED DATA AND BAR CODE SCANNER OUTPUT.

ILLUSTRATIONS OF POSSIBLE DATA COLLECTION SYSTEM ARCHITECTURES



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[signature]	9/21/89	Steve Koenck	10-2-89

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ENGINEERING LOG SHEET

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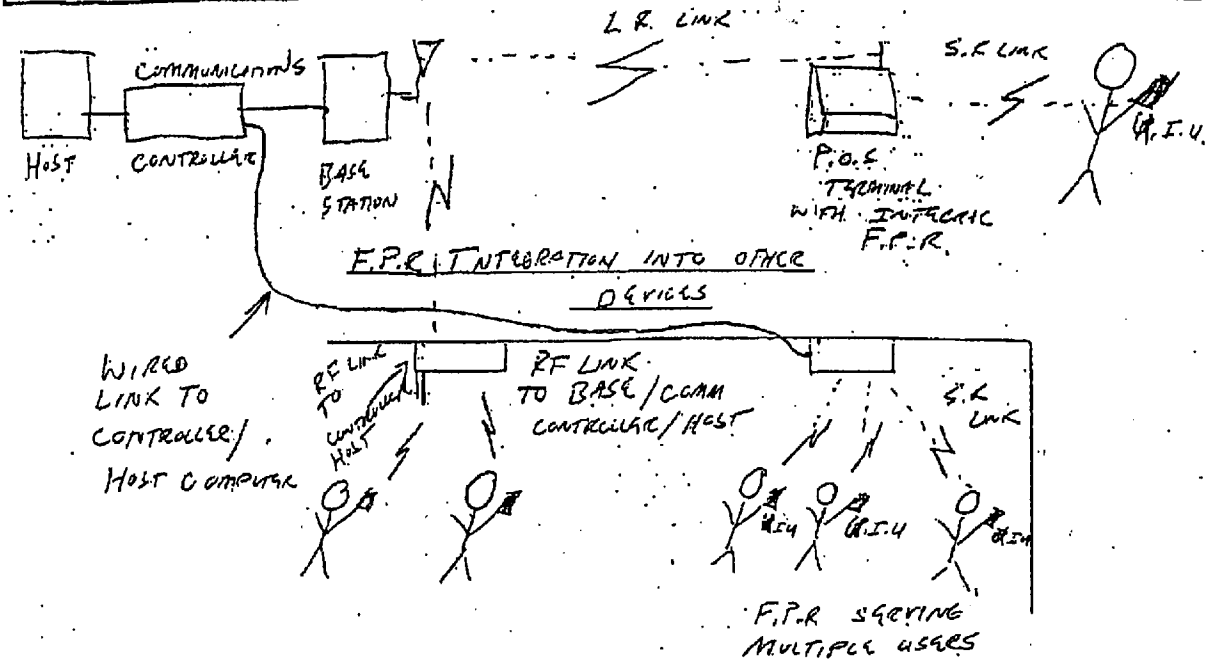
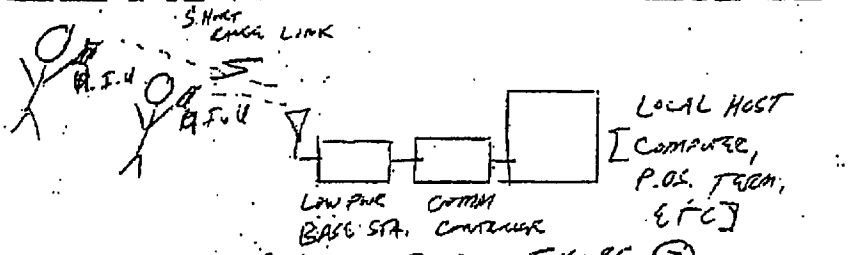
TITLE	MODEL

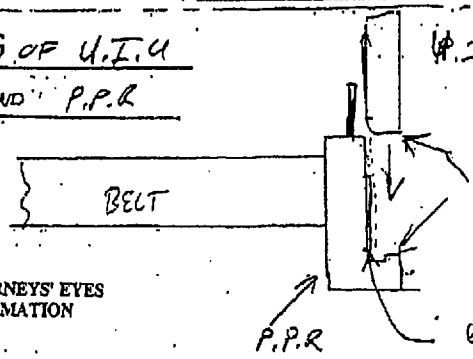


NETWORKED F.P.RS — FIGURE (2)



LOCAL AREA COMMUNICATION FIGURE (3)

MATING OF U.I.U AND P.P.R



INTERCONNECTION OF U.I.U, P.P.R FIGURE (4)

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	9/21/89	Steve Kunak	10-2-89

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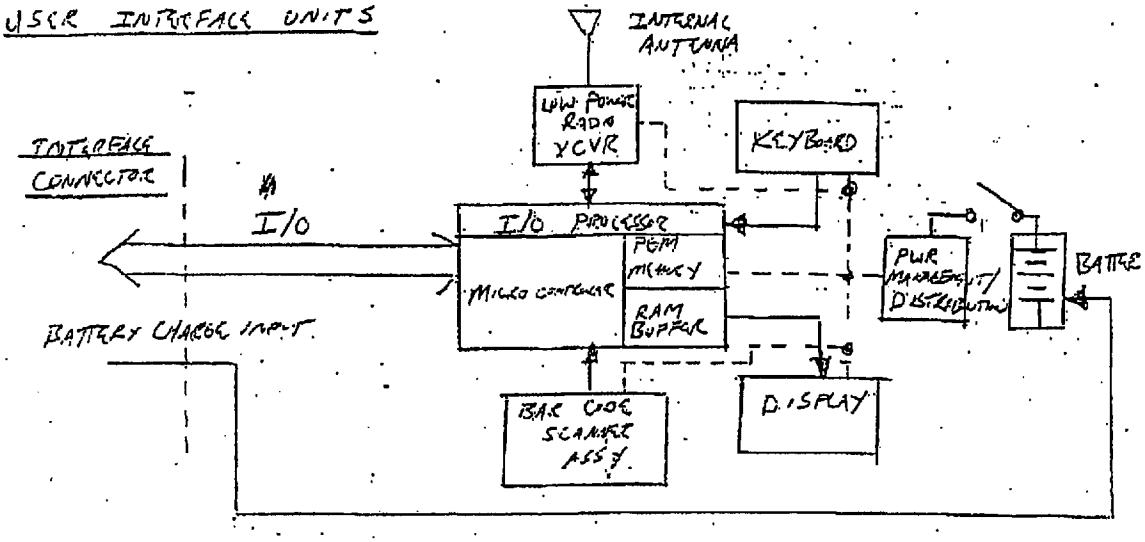
TITLE | MODEL

HARDWARE ARCHITECTURE — FIGURE (5)

USER INTERFACE UNITS



USER INTERFACE PERIPHERALS — EXAMPLES

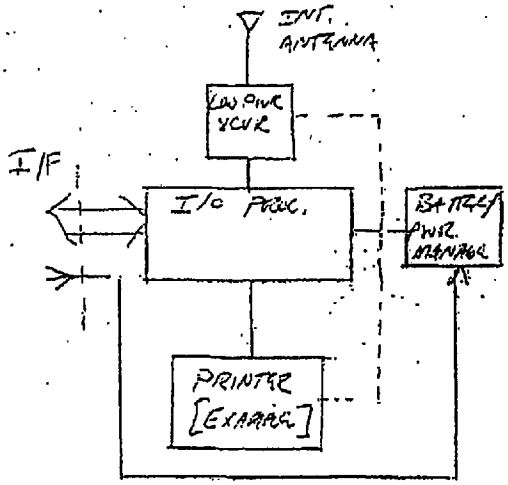
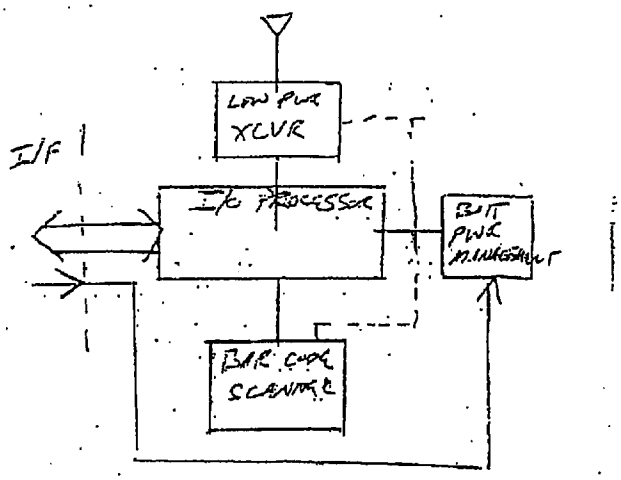


FIGURE (6A) PRINTER



DEDICATED SCANNER FIGURE (6B)

OTHER OPTIONS - MAG-STRIPE, SMART CARD, RF TAG, ETC

WRITER | DATE 9/21/89 | WITNESS Steve Koenck | DATE 10-2-89

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TITLE	MODEL
P.P.R / M.P.R / F.P.R ARCHITECTURES	

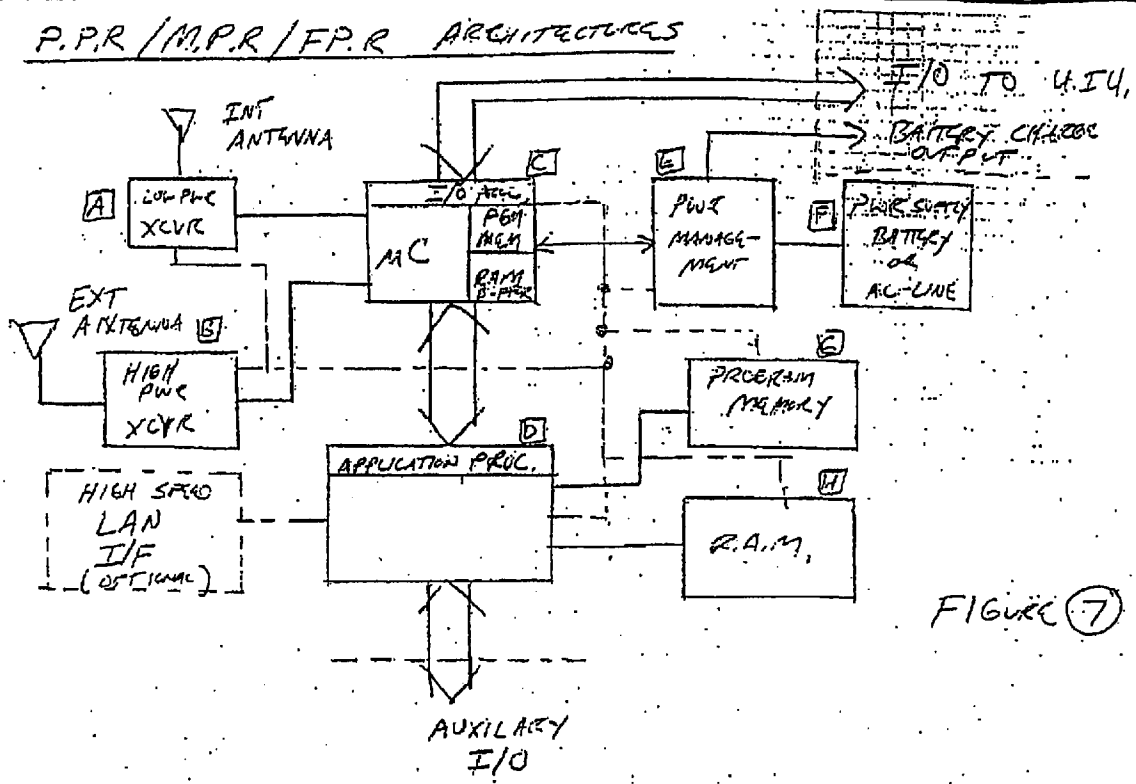

FIGURE (7)

THERE ARE NUMEROUS POSSIBLE VARIATIONS OF THIS ARCHITECTURE. FOR EXAMPLE, IF ONLY A STORE AND FORWARD OPERATION IS REQUIRED, D, E, H CAN BE ELIMINATED; REDUCING COST. IT MAY ALSO BE POSSIBLE TO COMBINE TAL I/O PROC AND APPLICATIONS PROCESSOR IN A SINGLE, MORE POWERFUL DEVICE.

LASTLY, IF THE LOCAL AREA COMMUNICATION SCHEME OF FIGURE (3) IS REQUIRED, THE HIGH POWER TRANSCEIVER B CAN BE OMITTED. EVEN IN THIS INSTANCE THE APPLICATION PROCESSOR CAN BE CONFIGURED (PROGRAMMED)

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WRITER	DATE	WITNESS	DATE
	9/21/89	Steve Knud	10-2-89

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE 9 OF ___ PAGES 0016710

TITLE | MODEL

RADIO LINK CONSIDERATIONS

NEW FCC REGULATIONS ENACTED 6/89 PERMIT WIDER LATITUDE IN SELECTION OF SHORT RANGE COMMUNICATION APPROACHES REQUIREMENT IS THAT RADIATED FIELD STRENGTHS NOT EXCEED CLASS B COMPUTER EMISSIONS LIMITS WITH FEW RESTRICTIONS ON FREQUENCY OF OPERATION AND NO DUTY CYCLE LIMITATIONS. UTILIZING THESE REGULATIONS, VERY COST EFFECTIVE SHORT RANGE RADIO LINKS CAN BE UTILIZED. THE PREFERRED IMPLEMENTATION IS TO USE THE WELL KNOWN TECHNIQUE OF SEMI DUPLEX OPERATION BETWEEN THE TRANSCEIVER IN THE P.P.R UNIT AND ALSO THE U.I.U AND OTHER PERIPHERAL DEVICES. THE SELECTION OF A DATA TRANSMISSION (MODULATION) METHOD IS ARBITRARY - EITHER AMPLITUDE OR ANGLE MODULATED SCHEMES CAN BE USED -- DEPENDING ON OTHER SYSTEM CONSTRAINTS. FOR ILLUSTRATIVE PURPOSES FSK TRANSMISSION IS INDICATED HERE.

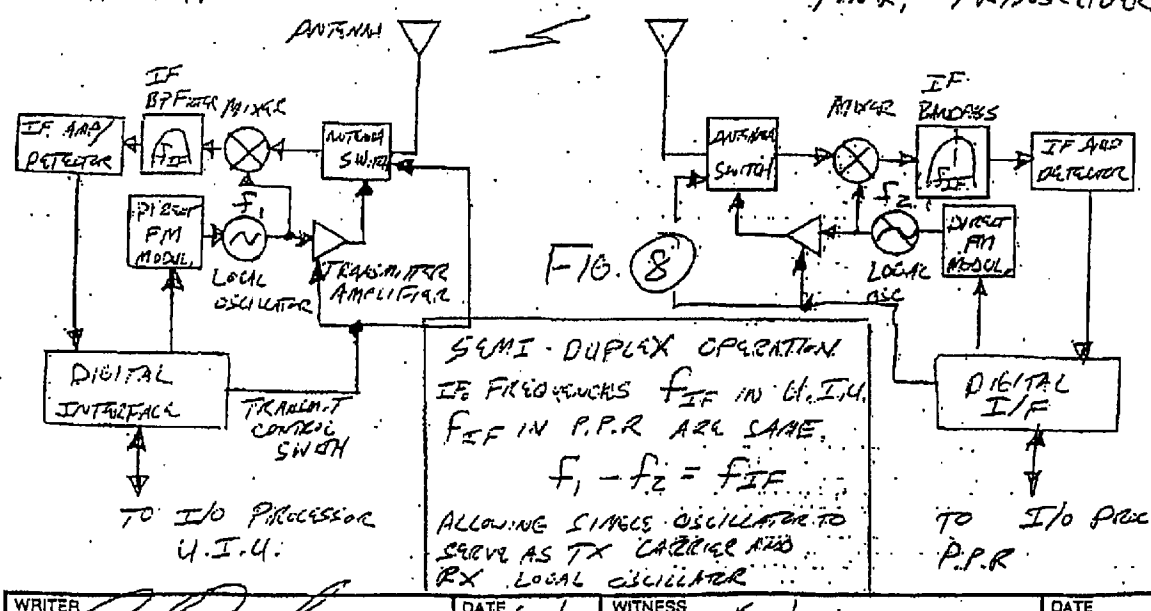

FIG. 8

SEMI-DUPLEX OPERATION

IF FREQUENCIES f_{IF} IN U.I.U. f_{IF} IN P.P.R ARE SAME.

$$f_1 - f_2 = f_{IF}$$

ALLOWING SINGLE OSCILLATOR TO SERVE AS TX CARRIER AND RX LOCAL OSCILLATOR

WRITER | DATE 9/21/89 | WITNESS Steve Kovach | DATE 10-2-89

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BCMSA006652

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE 18 OF ___ PAGES 0016711

TITLE	MODEL

THE SIMPLIFIED ILLUSTRATION IN FIG (8) CAN BE EXPANDED TO INCLUDE OTHER TECHNIQUES WHICH ARE COMMONLY KNOWN IN THE RADIO ART: ~~AA~~ USE OF MULTIPLE CONVERSION RECEIVERS, e.g. f_{IF} OF 10.7 MHZ, 455 KHZ IN EACH RECEIVER ~~AA~~; USE OF FREQUENCY SYNTHESIS OR CRYSTAL SELECT CIRCUITS TO PROVIDE MULTIPLE CHANNEL CAPABILITY — FREQUENCY DIVISION MULTIPLEXING OR INTERFERENCE AVOIDANCE ETC. FREQUENCY DIVISION MULTIPLEXING WOULD BE IMPORTANT IN CASES WHERE MANY P.P.R/U.I.U (and PERIPHERALS) COMBINATIONS MAY BE OPERATING IN NEAR PROXIMITY. EACH P.P.R CAN BE ASSIGNED A UNIQUE OPERATING FREQUENCY, AVOIDING INTERFERENCE BETWEEN USERS, AND ALLOWING EACH TO HAVE FULL ACCESS TO THE AVAILABLE SYSTEM BANDWIDTH (AVAILABLE DATA TRANSMISSION RATE). INTERFERENCE AVOIDANCE CAPABILITY IS IMPORTANT BECAUSE OF THE POTENTIAL FOR INTERFERENCE FROM EITHER DIGITAL DEVICES OR OTHER COMMUNICATIONS DEVICES. TO AVOID INTERFERENCE THE P.P.R. CAN MONITOR AVAILABLE CHANNELS AND SELECT ONE WHICH IS CLEAR. U.I.U.'S AND PERIPHERAL DEVICES ~~ARE~~ ARE SIMILARLY PROGRAMMED TO OPERATE ON THE SELECTED FREQUENCY BY PLUGGING THEM INTO THE P.P.R INTERFACE CONNECTOR. FREQUENCY SELECTION IS THEN DOWNLOADED TO THE SLAVE DEVICE. POSSIBLY TWO ALTERNATIVE FREQUENCIES CAN BE DOWNLOADED IN CASE MOBILE OPERATION

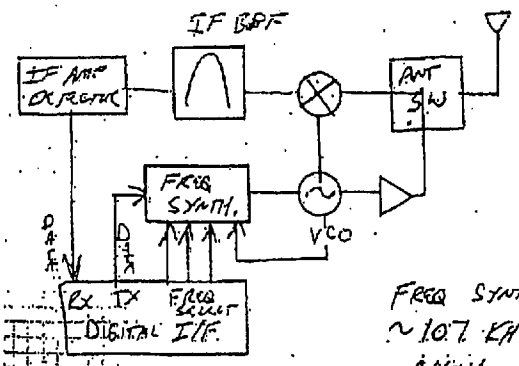


FIGURE 9

FREQ SYNTH REF ~10.7 KHZ ACTING 10.7 MHZ I.F.

WRITER	DATE	WITNESS	DATE
[signature]	9/21/89	Steve Kench	10-2-89

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE 11 OF ___ PAGES 0016712

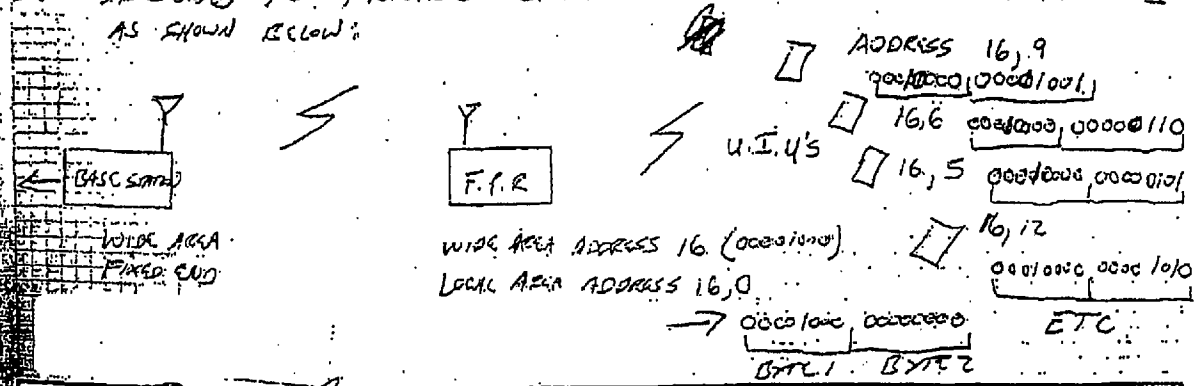
TITLE	MODEL

RESULTS IN MOVEMENT TO AN AREA WHERE THE FIRST SELECTED FREQUENCY IS SUBJECT TO INTERFERENCE. LOSS OF COMMUNICATIONS FOR AN UNACCEPTABLY LONG PERIOD WOULD TRIGGER BOTH P.P.R AND SLAVE UNITS TO MOVE TO THE ALTERNATIVE, SECOND FREQUENCY.

COMMUNICATIONS HANDLING BETWEEN P.P.R AND U.I.U.'S & PERIPHERALS

ADDRESSING

COMMUNICATIONS BETWEEN MASTER (P.P.R / M.P.R. / F.P.R) AND SLAVE UNITS (U.I.U / PERIPHERALS) REQUIRES THAT UNITS BE IDENTIFIED BY UNIQUE ADDRESSES. SINCE THE MASTER UNITS ARE ALSO REQUIRED TO HAVE ADDRESSES. WITHIN THE CONTEXT OF THE LONG RANGE (WIDE AREA) COMMUNICATION SYSTEM, IT IS LOGICAL TO USE THAT ADDRESS, WITH AN EXTENSION, TO PROVIDE ADDRESSING FOR LOCAL AREA COMMUNICATIONS. FOR EXAMPLE, IF THE WIDE AREA SYSTEM UTILIZES A SINGLE BYTE FOR ADDRESSING (128 UNITS) THE ADDITION OF A SECOND BYTE WOULD ALLOW UP TO 128 LOCAL AREA UNITS TO COMMUNICATE WITH A SINGLE P.P.R. THE P.P.R COULD BE GIVEN EXTENSION ADDRESS 00000000, SLAVE UNITS 00000001 THROUGH 11111111. SINCE IT IS UNLIKELY THAT ANY SYSTEM IMPLEMENTATION WOULD REQUIRE SUCH A LARGE NUMBER OF LOCAL AREA UNITS, ADDRESSES COULD BE ASSIGNED TO PROVIDE CODING DISTANCE BETWEEN ADDRESSES AS SHOWN BELOW:



WRITER	DATE	WITNESS	DATE
	9/20/89	Steve Kondi	10-2-89

Form Part No: 910-075-000

TITLE | MODEL

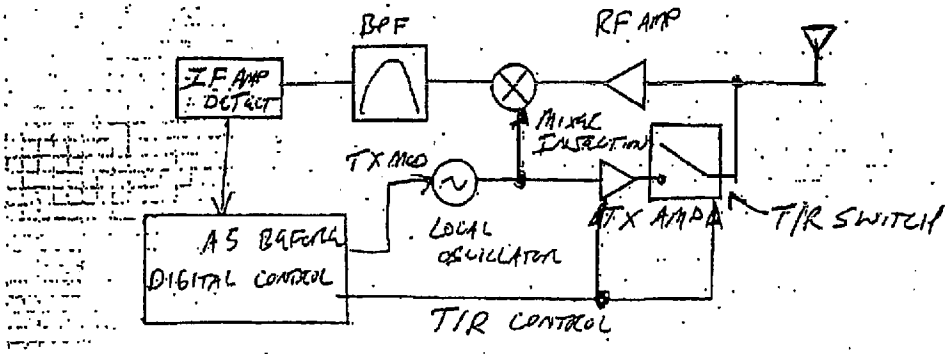
USE OF THE ADDRESS/EXTENSION TYPE OF ADDRESSING PREVENTS U.I.U'S THAT ARE ASSIGNED TO A GIVEN MASTER UNIT FROM COMMUNICATING ACCIDENTLY WITH ANOTHER MASTER UNIT ON THE SAME FREQUENCY. SHORTER ADDRESSING FIELDS MIGHT BE USED IF SYSTEM CONSIDERATIONS ELIMINATE THE POSSIBILITY OF 2 MASTER UNITS UTILIZING THE SAME FREQUENCY, OR IF SYSTEM FEATURES SUCH AS ROAMING ARE IMPLEMENTED.

ANOTHER CONSIDERATION IN ADDRESSING IS PRIORITIZING COMMUNICATIONS. COMMUNICATIONS BETWEEN U.I.U'S AND THE MASTER UNIT SHOULD TAKE PRECEDENCE OVER COMMUNICATIONS TO PERIPHERALS, WHICH CAN RUN AS BACKGROUND OR SECONDARY OPERATIONS.

THE PREFERRED METHOD OF COMMUNICATIONS IS TO USE A PACKET ORIENTED PROTOCOL, WITH VARIABLE PACKET LENGTH. ~~PARAMETER~~ MINIMUM AND MAXIMUM ALLOWED PACKET LENGTHS CAN BE DETERMINED FOR EACH TYPE OF DEVICE BASED UPON ITS INDIVIDUAL CHARACTERISTICS - E.g. a U I U may have MIN PACKETS OF 1 CHARACTER AND A MAX OF N, WHERE N IS THE TOTAL NUMBER OF CHARACTERS WHICH CAN BE DISPLAYED ON THE U.I.U. SINCE THE NUMBER OF INDIVIDUAL UNITS -- U.I.U'S OR PERIPHERALS -- IN COMMUNICATION WITH A GIVEN P.P.R. OR OTHER MASTER IS LIKELY TO BE RELATIVELY SMALL DUE TO THE SHORT RADIUS OF COMMUNICATION OF THE SHORT RANGE UNIT, A CONTENTION BASED ACCESS SCHEME IS MOST DESIRABLE. AN APPROACH SUCH AS RTC IS ONE POSSIBLE CANDIDATE. TRADITIONAL ACCESS SCHEMES SUCH AS CSMA ARE UNACCEPTABLE BECAUSE SEMI DUPLEX OPERATION DOES NOT ALLOW ~~ALL~~ SLAVE UNITS (U.I.U'S/PERIPHERALS) TO MONITOR EACH OTHERS TRANSMISSIONS. A HARDWARE VARIATION FOR THE SHORT RANGE RADIO COMPONENT WHICH DOES ALLOW CSMA IS SHOWN ON THE FOLLOWING PAGE.

WRITER [signature] | DATE 9/22/89 | WITNESS Steve Kramek | DATE 10-2-89

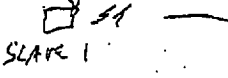
TITLE | MODEL



P.P.R TRANSCEIVER

IN THIS CONFIGURATION, ~~WHEN THE P.P.R BEGINS TO RECEIVE~~ NORMALLY THE P.P.R TRANSMITTER AMP AND T/R SWITCH ARE MAINTAINED IN A TRANSMIT OFF CONDITION, SWITCH OPEN, NO BIAS APPLIED TO TRANSMIT AMP. WHEN RECEIPT OF A VALID MESSAGE BEGINS, THE T/R LINE IS ACTUATED, CAUSING AN UNMODULATED SIGNAL TO BE TRANSMITTED AS A "CHANNEL BUSY" TONE FOR ALL SLAVE UNITS TO MONITOR. THE RF AMP IS NECESSARY TO PROVIDE ISOLATION AGAINST THE RECEIVE MIXER INJECTION RADIATING AT HIGH LEVEL AND APPEARING AS A BUSY TONE. A SINGLE STAGE CAN PROVIDE ABOUT 30 dB OF REVERSE ISOLATION. THE T/R SWITCH WOULD BE IMPLEMENTED WITH A PIN DIODE - SIMPLE AND INEXPENSIVE.

A CSMA ACCESS PROTOCOL USING THIS HARDWARE APPROACH TO GENERATE A BUSY TONE HAS A DISTINCT ADVANTAGE OVER TRADITIONAL SINGLE CHANNEL CSMA -- ELIMINATION OF NEAR FAR CONTENTION. ALL SLAVE UNITS WITHIN RANGE OF THE MASTER UNIT CAN HEAR THE BUSY TONE, AVOIDING THE SITUATION BELOW WHERE SLAVE 1 IS TRANSMITTING TO THE MASTER, SLAVE 2 OUT OF RANGE OF SLAVE 2, FINDS THE CHANNEL CLEAR AND TRANSMITS CORRUPTING SLAVE 1'S TRANSMISSION

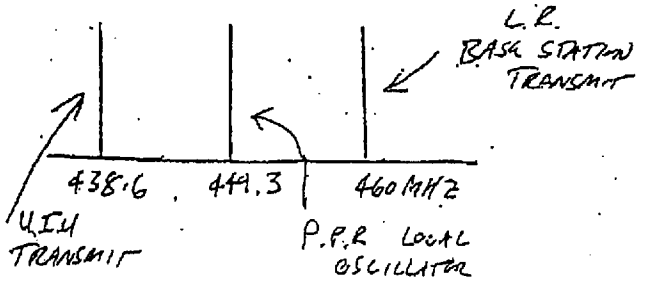


WRITER | DATE 9/22/89 | WITNESS Steve Konek | DATE 10-2-89

TITLE | MODEL

THE PRECEDING DISCUSSION ASSUMES COMPLETE INDEPENDENCE OF SHORT RANGE AND LONG RANGE COMMUNICATIONS LINK HARDWARE. THE LONG RANGE LINK COULD BE UHF, VHF, SPREAD SPECTRUM ETC OPERATING RESPECTIVELY AT 450 MHZ OR 800 MHZ, 150 MHZ, 902-928 MHZ, WHILE THE SHORT RANGE LINK COULD OPERATE ANYWHERE IN THE FREQUENCY BAND UNDER FCC CLASS B LIMITS. LIKELY SPECTRUM FOR SHORT RANGE OPERATION COULD BE UHF TV BAND 470-800 MHZ, OR 1.1 - 1.3 GHZ WHICH IS LITTLE UTILIZED.

A POSSIBLE MEANS OF SIZE, COST, POWER REQUIREMENT REDUCTION IS TO COMBINE LONG RANGE AND SHORT RANGE FUNCTIONS IN A SINGLE TRANSCEIVER IN THE MASTER UNITS. IN A CRYSTAL CONTROLLED DESIGN, THIS IS ACCOMPLISHED BY EITHER USING A CRYSTAL BANK SWITCH TO SELECT BETWEEN LONG RANGE AND SHORT RANGE FREQUENCIES, OR BY OPERATING THE SHORT RANGE LINK ON THE IMAGE OF THE LONG RANGE LINK RECEIVER. EXAMPLE USING UHF, 10.7 MHZ IF



P.P.R IS CAPABLE OF RECEIVING BOTH L.R BASE, AND U.I.U. MODULATION OF P.P.R LOCAL OSCILLATOR PROVIDES RETURN LINK TO U.I.U.

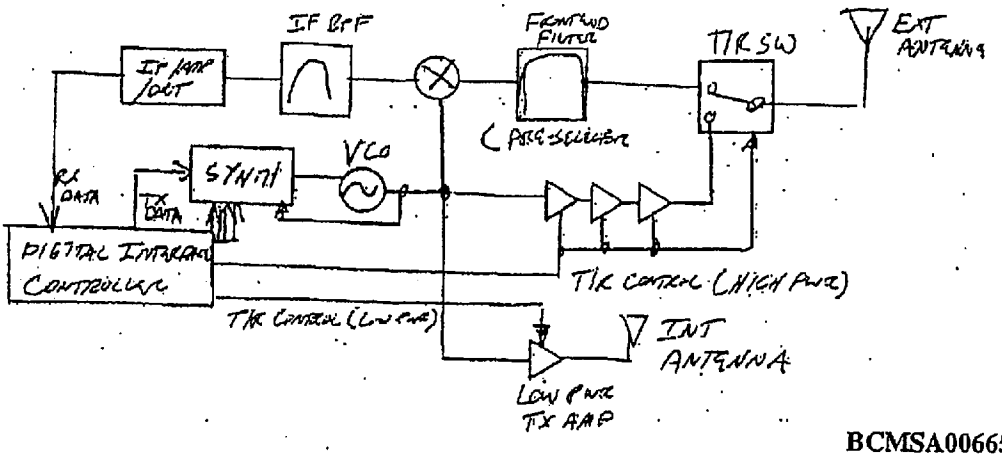
WRITER [signature] DATE 9/22/89 | WITNESS Steve Kovach DATE 10-2-89

TITLE | MODEL

THIS APPROACH IS PRACTICAL IN SOME SITUATIONS, BUT IS TO BE AVOIDED IN SITUATIONS WHERE INTERFERENCE AT THE IMAGE IS A POSSIBILITY (DUE TO ALLOCATION OF FREQUENCIES TO HIGH PWR SOURCES) OR WHERE CONTENTION BETWEEN L.R. AND SHORT RANGE COMMUNICATIONS WILL OCCUR FREQUENTLY, E.G. WHEN THE L.R. LINK USES A POLLED PROTOCOL.

IN A SYNTHESIZED DESIGN, SEPARATE CHANNELS FOR LONG RANGE AND SHORT RANGE CHANNELS CAN BE ESTABLISHED WITH TO MASTER UNIT USING TDM TECHNIQUES TO MULTIPLEX BETWEEN THE TWO LINKS.

HARDWARE ARCHITECTURE FOR THE MASTER UNIT RADIO IS SIMILAR TO THE SYNTHESIZED RADIO DIAGRAM PRESENTED EARLIER, EXCEPT FOR THE ADDITION OF A HIGH POWER TRANSMITTER AND A SECOND ANTENNA. IN GENERAL, THE HIGH POWERED TRANSMITTER WILL USE AN EXTERNAL WHIP TYPE ANTENNA, WHILE THE LOW PWR LINK WILL USE AN INTERNAL ANTENNA FOR TRANSMISSION BECAUSE OF THE NEED TO CONTROL RADIATED SIGNAL STRENGTH TO MEET FCC EMISSIONS LIMITS.



BCMSA006658

WRITER [signature] | DATE 9/26/89 | WITNESS Steve Kovach | DATE 10-2-89

OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE 16 OF ___ PAGES 0016717

TITLE	MODEL

9/29

IN THIS APPROACH THE FREQUENCY SYNTHESIZER IS PROGRAMMED TO ALTERNATELY ~~TO S~~ SWITCH BETWEEN MIXER INJECTION FREQUENCIES FOR THE HIGH POWER AND LOW POWER CHANNELS. ACCORDINGLY, LONG RANGE AND SHORT RANGE PROTOCOLS MUST ALLOW PERIODS WHEN COMMUNICATION CAN BE SUSPENDED. THE LOW POWER COMMUNICATION CHANNEL MUST BE SELECTED TO FALL WITHIN THE BANDWIDTH OF THE RECEIVER PRE-SELECTOR FILTER. IF THE SAME INTERMEDIATE FREQUENCIES ARE ACCEPTABLE IN BOTH LONG RANGE AND SHORT RANGE SYSTEMS THE SEMI-DUPLEX SCHEME OUTLINED EARLIER CAN BE IMPLEMENTED. DIFFERING IF'S CAN BE SELECTED IF SYSTEM REQUIREMENTS DICTATE A NEED. FOR COST REASONS IT IS BEST TO MAINTAIN SEMI DUPLEX OPERATION IN THE U.I.U.'S AND PERIPHERALS, AND REQUIRE THE P.C.R TO SWITCH BETWEEN TX AND RX FREQUENCIES AS IT WOULD IN A TRADITIONAL SIMPLEX TRANSCEIVING SYSTEM.

BCMSA006659

WRITER	DATE	WITNESS	DATE
	9/29/89	Steve French	10-2-89

OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET

PAGE ____ OF ____ PAGES 0016718

TITLE	MODEL
PORTABLE HAND HELD COMMUNICATIONS SYSTEM	

ADDITIONS: ENCRYPTION — KEY FOR PERIPHERALS REQUIRING SECURITY — CHECK VARIFACE MAG CARD.

BCMSA006660

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WRITER	DATE	WITNESS	DATE

Norand Part No. 910-075-000

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE ___ OF ___ PAGES 0016719

TITLE	MODEL
FREQUENCY HOP CONCEPTS / INDUSTRIAL AP'S	

WHY FREQUENCY HOP?

CONCERNS ABOUT SYSTEM RANGE / AND INTERFERENCE REJECTION WITH D.S. SYSTEMS IN A NOISY, UNREGULATED ENVIRONMENT. F.H. POTENTIALLY OFFERS BETTER INTEREST THAN D.S., CONSIDERING DESIRED DATA RATES AND AVAILABLE BANDWIDTH. DS POTENTIALLY OFFERS BETTER MULTIPATH IMMUNITY

FCC PROPOSED RULES

FREQUENCY HOP
- 50 FREQ IN PSEUDO RANDOM SEQUENCE
- 100 MS MAX ON CHANNEL IN 5 SEC PERIOD
- 500 KHZ MAXIMUM BANDWIDTH
- NO FREQ REPEATS IN SEQUENCE

DATA RATE / RADIO TECHNOLOGY OPTIONS

(1) USE FULL BW ALLOWED, 25KBIT FM
~ 50KBIT DPSK

DISPERSIVE CHANNEL — MULTIPATH ISSUES
COMPLEX IMPLEMENTATION
DC COUPLED DATA
37 AVAILABLE FREQUENCIES
COST?

(2) USE REDUCED BW, CONVENTIONAL FM. APPROACH
MANCHESTER DATA ALLOWS AC COUPLING
COMMERCIAL FM FILTERS ~ 230KHZ BW ALLOWS 75KBIT/SEC
SPACE 300KHZ CHANNELS ~ 85 FREQUENCIES
400KHZ CHANNELS ~ 65 FREQUENCIES BETTER ADJ CHAN

(3) USE PLESSEY CT-2 RECEIVER SET
~ 80KBit MAXIMUM DATA RATE WITH ~ 12KHZ CCC BW
DIRECT CONVERSION - NO IF SWITCHING REQUIREMENTS
WILL BE LOW COST
NO CLOCK RECOVERY PULSES - DATA OUT - USE HOLD
CHANNELS AT 250KHZ SPACING → 104 CHANNELS
SIMPLE, RISK IS AVAILABILITY

WRITER	DATE	WITNESS	DATE

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BCMSA006661

TITLE: FREQUENCY HOP, CONTINUED. MODEL:

OF THESE ALTERNATIVES (3) IS MOST DESIRABLE
(2) IS BEST FALL BACK POSITION

OTHERS?

PROTOCOL CONSIDERATIONS

BIGGEST ISSUE WITH F. HOPPING IS ACQUIRING AND MAINTAINING HOPPING SYNCHRONIZATION, WHILE ALLOWING FLEXIBILITY IN DATA COMMUNICATIONS.

FOR HOPPING IT IS DESIRABLE TO UTILIZE FIXED FRAME LENGTHS. THIS ALLOWS PORTABLE UNITS TO POWER DOWN OR SLEEP AND REGAIN THE SYSTEM FULLY SYNCHRONIZED AND READY TO TRANSMIT OR RECEIVE

FOR DATA COMMUNICATIONS, IT IS DESIRABLE TO ALLOW FLEXIBILITY IN FRAME LENGTH, BECAUSE MESSAGE LENGTHS DIFFER FROM APPLICATION TO APPLICATION — ALSO BASE → TERMINAL, TERMINAL → BASE LENGTHS MAY DIFFER IN THE SAME APPLICATION.

WITH THE PROPOSED 5 SEC SEQUENCE LENGTH PROVISIONS OF THE RULES, ACQUISITION IS FAR LESS OF A CONCERN THAN PREVIOUSLY WITH THE 30 SEC PROVISIONS. SIMPLE MEASURES EASILY ALLOW GUARANTEED ACQUISITION TIMES OF LESS THAN 10 SECONDS AT INITIAL POWER UP, WITH REASONABLE ACCURATE TIME KEEPING FUNCTIONS WITHIN TERMINALS, AND PERIODIC MEANS OF UPDATING TIMING EMPLOYED WITHIN THE PROTOCOL.

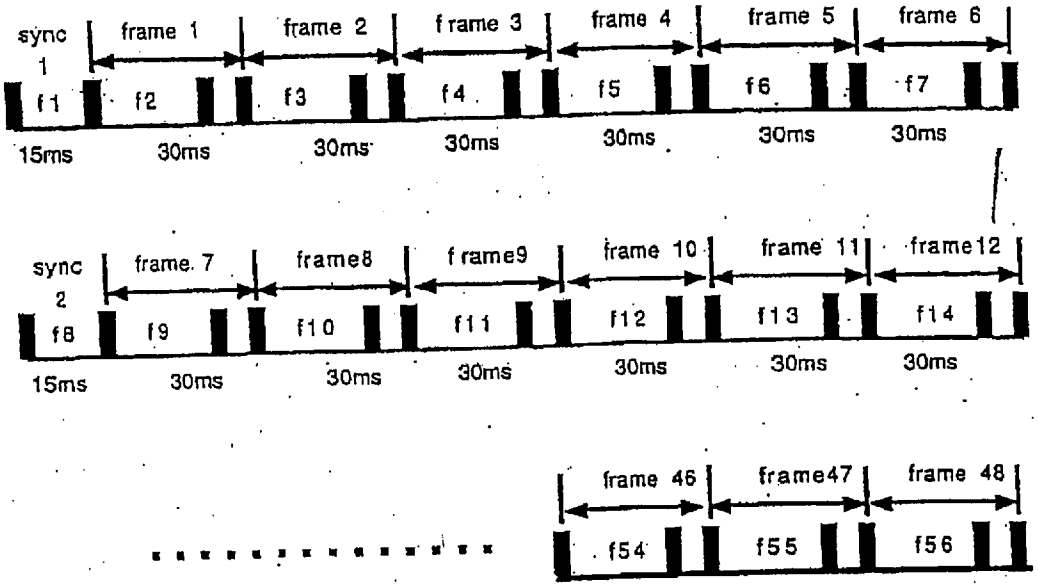
THE AVAILABILITY OF HIGHER DATA RATES EASES SOME OF THE CONCERNS ABOUT OBTAINING FULLY VARIABLE MESSAGE LENGTH CAPABILITIES — THE EMPHASIS IN SYSTEM PERFORMANCE IS GENERALLY RESPONSE TIME RATHER THAN THROUGHPUT, AND IF MESSAGES RUN SHORTER THAN A FIXED FRAME LENGTH THE REMAINDER OF THE FRAME CAN BE FILLED WITH REDUNDANT ERROR CONTROL INFORMATION TO REDUCE RETRANSMISSION REQUIREMENTS

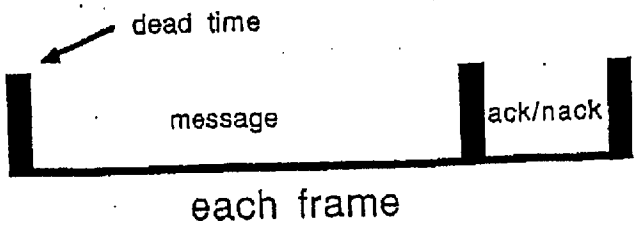
WRITER | DATE | WITNESS | DATE

OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

TITLE | MODEL

A DIAGRAM ILLUSTRATING A FREQUENCY HOPPING PROTOCOL BASED UPON SLOTTED ALOHA CONCEPTS IS SHOWN BELOW. FIXED FRAME LENGTHS ARE AN INHERENT FEATURE OF S.A PROTOCOLS USED ON SIMPLE CHANNEL SYSTEMS, SO APPLICATION OF S.A. IN FREQUENCY HOPPING IS STRAIGHTFORWARD.





WRITER | DATE | WITNESS | DATE

OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

TITLE | MODEL

THE PROTOCOL UTILIZES TWO BASIC TYPES OF FIXED FRAMES: SYNC FRAMES ARE USED TO AID INITIAL ACQUISITION, AS TIMING MARKERS TO AID UNITS ALREADY SYNCHRONIZED IN MAINTAINING SYNCHRONIZATION BY PROVIDING SYSTEM MASTER CLOCK INFORMATION, AND FOR COMMUNICATING SYSTEM INFORMATION. SYNC ~~FRAME~~ FRAME TRANSMISSIONS ALWAYS ORIGINATE AT THE BASE STATION WHICH SERVES AS A SYSTEM MASTER CONTROLLER.

COMM FRAMES ARE USED FOR ALL COMMUNICATIONS. BOTH MASTER TO REMOTE, AND REMOTE TO REMOTE COMMUNICATIONS ARE POSSIBLE, ALTHOUGH IN OUR TRADITIONAL APPLICATIONS, MASTER/REMOTE COMMUNICATIONS ARE SUFFICIENT TO PROVIDE THE REQUIRED FUNCTION. COMM. FRAMES CONSIST OF A MESSAGE FIELD, AND AN ACKNOWLEDGE FIELD.

EACH FRAME (SYNC OR COMM) UTILIZES A DIFFERENT FREQUENCY IN THE HOPPING SEQUENCE ($f_1, f_2, f_3 \ldots f_{56}$ IN THE diagram) WHICH IS STORED IN MEMORY IN EACH UNIT. ALL UNITS EMPLOY INTERNAL TIME KEEPING FUNCTIONS TO MAINTAIN HOPPING SYNCHRONIZATION AT THE FRAME BOUNDARIES. FRAME LENGTH IS USER PROGRAMMABLE, DEPENDING ON THE MAXIMUM EXPECTED INFORMATION BLOCK TRANSMISSION AND SUBJECT TO THE 100ms MAXIMUM DWELL ON FREQUENCY PROVISION OF THE RULES. LENGTH OF SYNC FRAMES IS FIXED BY SYSTEM COMMUNICATION REQUIREMENTS. VARIABLE COMM FRAME LENGTH ALLOWS RESPONSE TIME IMPROVEMENTS FOR SYSTEM INSTALLATIONS WHERE ONLY SHORT MESSAGE TRANSMISSIONS ARE REQUIRED.

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WRITER | DATE | WITNESS | DATE

Norand Part No. 910-075-000

BCMSA006664

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE ___ OF ___ PAGES 0016723

TITLE	MODEL

COMMUNICATIONS SESSIONS

A COMMUNICATION SESSION CAN BE INITIATED BY EITHER THE BASE OR A PORTABLE UNIT. COMM FRAMES (frame1, frame2, ... FRAME N) CAN BE EITHER RANDOM ACCESS FRAMES, OR ASSIGNED FRAMES. GENERALLY ASSIGNED FRAMES WILL BE USED FOR BASE INITIATED SESSIONS ONLY, BUT THEY COULD BE USED FOR PORTABLE INITIATED SESSIONS AS WELL, IF DESIRED.

OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

WRITER	DATE	WITNESS	DATE

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NORAND DATA SYSTEMS

ENGINEERING LOG SHEET

 0016724

TITLE	MODEL

OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

WRITER	DATE	WITNESS	DATE

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE 1 OF ___ PAGES 0016725

TITLE: GUASSIAN / G.T. FILTERS - $\alpha \pm jB$ to W_o, Q CONVERSION

MODEL:

WILLIAMS PROVIDES POLE LOCATIONS FOR VARIOUS FILTER TYPES IN COMPLEX FORM ~ $S - \alpha \pm jB$. TESS REQUIRES INPUT IN W_o, Q FORM, CONVERSION IS

$$W_o = \sqrt{\alpha^2 + B^2} \qquad Q = \frac{W_o}{2\alpha}$$

FOR COMPLEX POLE PAIRS, NORMALIZED TO 1 RAD/SEC

TO DENORMALIZE USE STANDARD METHOD

$$W_o' = W_c W_o$$

$$Q' = Q$$

FROM WILLIAMS — 6 dB GUASSIAN TRANSITIONAL

n	REAL $-\alpha$	IMAGINARY $\pm jB$	W_o	Q
3	.9622	1.2214		
	.9776			
4	.7940	.5029	.940	.592
	.6304	1.5407	1.665	2.641
5	.6190	.8254	1.03172	.83337
	.3559	1.5688	1.60866	2.24
	.6650		.6650	

UNEAR PHASE, 0.5° EQUIRIPPLE ERROR

3	.6969	1.1318		
	.8257			
	.7448	.5133		
	.6037	1.4983		
	.6775	.9401		
	.5412	1.8256		
	.7056			

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WRITER	DATE	WITNESS	DATE

Norand Part No. 910-075-000

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET

PAGE 1 OF ___ PAGES 0016726

TITLE	MODEL
UNIDEN HUMIDITY / TEMP CYCLING	

INVESTIGATE TX OSC DRIFT OF UNIDEN RADIO BOARDS

1ST PASS

5 BOARDS CONTROL

5 BOARDS CT201 → 22pF NPO

5 BOARDS - REMOVE OUTPUT TUNED CIRCUIT

CONTROL GROUP

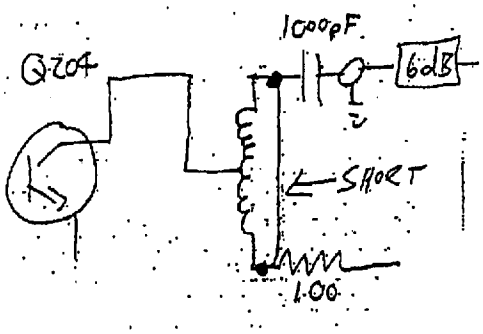
433A	461.0625	#6
398A	469.9625	#52
317A	"	#49
650A	450.3875	#1
641A	"	#5

REPLACE TRIMMER

770	469.9625	#1 (ENGINEERING SAMPLE)
784	461.0625	#7
730	461.0625	#8
683	450.3875	#10
722	450.3875	#9

DISCONNECT MULTIPLIER

705	450.3875	#8
341	461.0625	#14
728	461.0625	#9
692	469.9625	#50
721	469.9625	#51



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WRITER	DATE	WITNESS	DATE

Norand Part No. 910-075-000

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE____OF____PAGES 0016727

TITLE	MODEL

BCMSA006669

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WRITER	DATE	WITNESS	DATE

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE ____ OF ____ PAGES 0016728

TITLE	MODEL

AMBIENT TEMP 21°C

CONTROL GROUP

398	#52	469.96243	250Ω @ -111
317	49	.96237	AFTER 2 MEASURE
		469.96231	230Ω @ -112
		.96200	
650	1	450.38466	243Ω @ -112
		.38459	
641	5	450.38719	257. @ -112
		.38709	
433	6	461.06241	240 @ -111
		.06239	

TRIMMER REMOVED

730	#8	461.06299
683	#10	450.38518
722	#9	450.39657
784	#7	461.06112
707	#1	469.96055

MULTIPLIER DISCONNECTED

341	14	19.210932	(USE AUTO TRIMS)
692	50	19.581788	
705	#8	18.766155	
728	#9	19.210951	
721	51	19.581787	

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WRITER	DATE	WITNESS	DATE

Norand Part No. 810-075-000

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE ___ OF ___ PAGES 0016729

TITLE	MODEL

6 TRIMMERS

1	305 ∠ -89.6	
2	~~1230 ∠ -87.6~~	1176 ∠ -87.8
3	695 ∠ -89.6	
4	446 ∠ -87.2	
5	959 ∠ -89.6	
6	302 ∠ -87.5	

7 READINGS, NOT SURE V-I METER WORKING

AFTER SOAK

296	-89.6	W.C. .3%
1185	-88.7	PRETTY GOOD
689	-89.5	
443	-89.5	
960	-89.5	
305	-87.5	

BCMSA006671

OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

WRITER	DATE	WITNESS	DATE

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET

PAGE____OF____PAGES 0016730

TITLE	MODEL

RETEST AFTER 6 day SOAK 50°C 95% R.H.
5 HOUR ROOM TEMP. STABILIZATION

AMBIENT TEMP 23.5°C

			Δ FROM ORIGINAL
CONTROL GROUP			
398	469.9619		Δ = -337
317	469.96207		Δ = +70
650	450.38460		Δ = -10
641	450.38718		Δ = -90
433	461.0[illegible]5	.06279	Δ = +400
TRIMMER REMOVED			
730	461.06278		Δ = -210 Hz
683	450.38512		Δ = -60
722	450.39649		Δ = +80
784	461.06083		Δ = -290
707	.96046		Δ = -90

MULTIPLIER DISCONNECTED		Hz	PPM
341	19.210924	Δ = -80	-.42
692	19.581720	Δ = -68	-3.47
705	18.766152	Δ = -3	~
728	19.210321	Δ = -30	-1.56
721	19.581774	Δ = -13	-.66

OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

BCMSA006672

WRITER	DATE	WITNESS	DATE

Norand Corp. No. 010-075-000

NORAND DATA SYSTEMS

ENGINEERING LOG SHEET PAGE ___ OF ___ PAGES 0016731

TITLE	MODEL

ROUND #2 INITIAL +22 FINAL +20

UNMODIFIED

683	#10	450.38752	38738	-140
722	#9	450.38742	38762	+200
730	#8	461.06257	.06251	-60
784	#7	461.06253	06270	+170
707	#1	469.96254	96265	+110

TRIMMER REMOVED

398	#52	469.96155	96123	-300
317	#49	469.96392	96461	+110
650	#1	450.38664	.38670	+70
641	#5	450.38500	.38507	+70
433	#6	461.06170	.06182	+120

BCMSA006673

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WRITER	DATE	WITNESS	DATE

Norand Part No. 910075.000

NORAND DATA SYSTEMS

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TITLE	MODEL
B.R.S. APPLIED TO SPREAD SPECTRUM TRANSMISSION	

The concept of baudrate switching can be extended to apply to

BCMSA006674

OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

WRITER	DATE	WITNESS	DATE